The maximum depletion indicated under these conditions is 60,000,000,000 gallons.

Actual gagings of the four Catskill streams under consideration have been made by the United States Geological Survey more or less continually since 1901. The results of these gagings are set forth in the various water supply and irrigation papers published by the survey. Unfortunately, no rainfall observations were made contemporaneously with these gagings. A careful examination of practically all of the gagings made by the Geological Survey in New York, New Jersey, Pennsylvania, and New England since 1902 has caused us to use them as a general guide only.

CONCLUSIONS.

Our studies, therefore, lead us to the belief that the most probable mean annual rainfalls on the Catskill watersheds are as follows: Esopus, 44 inches; Schoharie, 41 inches; Rondout, 48 inches; Catskill, 38 inches.

VARIATION OF PRECIPITATION IN THE ADIRONDACK REGION.

By ALFRED J. HENRY, Professor of Meteorology. Dated April 17, 1907.

Mr. R. E. Horton, C. E., has worked out very clearly the relative distribution of precipitation in the Adirondack region for the five years, 1901-1905. The chart which accompanies Mr. Horton's article [1] shows a region of maximum precipitation (55 inches and upward) on the southwestern slope of the Adirondacks, particularly on the foothills in Lewis, Oneida, and Herkimer counties.

The writer was recently engaged on a study of the average annual precipitation over the watershed of Lake Ontario, which includes a portion of the area considered by Mr. Horton. The epoch used in this work was 1871–1906, altho the record at a number of the observing stations covered a much longer time. It is possible, therefore, to compare the mean values for the lustrum 1901–1905 with those of the much longer epoch, 1871–1906. Accordingly there will be found in the table below a statement showing the average annual precipitation for a few stations in the Adirondack region and contiguous territory for both the long and the short periods.

Comparative averages of precipitation.

Stations.	Length of record.	Whole period, 1871–1906.	Five years, 1901–05.	Departure.
	Years.	*Inches.*	*Inches.*	*Inches.*
Oswego	54	37.4	40.0	+2.6
Lowville	40	36.3	44.3	+8.0
Utica	40	41.7	50.7	+9.0
Cooperstown	53	39.9	45.3	+5.4
Keene Valley	15	35.6	40.7	+5.1

It is clearly apparent from the above table that the lustrum 1901–1905 was one of heavy precipitation in the Adirondacks; the greatest departure, about 22 per cent of the mean annual fall, occurred near the center of the region of maximum precipitation hereinbefore mentioned. The writer has found elsewhere [2] that the extreme variation in the interior of this continent for a 10-year period is as high as 20 per cent. The variation for a 5-year period in this country has not been determined; in Germany, however, Dr. G. Hellmann [3] has found that the average maximum variation of a 5-year period for 14 stations in North Germany is 116 per cent, and for a 10-year period 109 per cent. The maximum variation for a single station for a 5-year period was 128 per cent, or 6 per cent greater than for the two stations in the Adirondack region, but the majority of the German stations showed a smaller variation. What little work has been done on this subject in the United States tends to show that the variation of the precipitation, especially in the interior, is greater than in England or Germany.

[1] Monthly Weather Review, January, 1907, Vol. XXXV, pp. 8-11.
[2] Weather Bureau Bulletin D, p. 9.
[3] Die Niederschläge in den norddeutschen Stromgebieten.

In conclusion it is proper to call attention to the fact that the chart of rainfall distribution compiled by Mr. Horton probably represents very closely the maximum amount of rain that may be expected for a 5-year period in the region under consideration. Readers of the REVIEW should be careful, however, not to be misled by supposing that the chart purports to give the average or normal values for the Adirondack region, such as would result from a century of observations.

THE TEMPERATURE IN THE FRONT AND IN THE REAR OF ANTICYCLONES, UP TO AN ALTITUDE OF 12 KILOMETERS, COMPARED WITH THE TEMPERATURE IN THE CENTRAL AREA.

By HENRY HELM CLAYTON. Dated Blue Hill Observatory, Hyde Park, Mass., March 5, 1907.

Within the two years between the summer of 1904 and that of 1906, a series of observations with *ballons-sondes* were obtained at St. Louis, Mo., under the direction of Prof. A. Lawrence Rotch, by Mr. S. P. Fergusson and myself. These small balloons carried light instruments recording temperature and pressure, and occasionally reached heights of 17 kilometers or about 11 miles. These are the only data of this kind gathered in America up to the present time, and are of much interest and value in their bearing on the problems of the upper air. One of the problems of great interest is that of the distribution of temperature in cyclones and anticyclones. In a discussion of these observations published by me in the Beiträge zur Physik der freien Atmosphäre, Band II, Heft 2, 1906, the lowest temperatures (at the earth's surface) in the anticyclones were found in the central and southeastern portions, but this distribution was so changed at the height of 8 kilometers that the lowest temperature was found in the northern quadrant of the anticyclone. The reverse of this statement is true in regard to the cyclone in which the highest temperature was found in the eastern quadrant at the ground, but in the northern quadrant at the height of 8 kilometers. This matter is one of importance in studying the mechanism of these meteors and I give in the accompanying Table 1 some of the results in the individual cases where anticyclones past centrally over the region surrounding St. Louis. In this table the temperature at any height on the day in which the maximum pressure occurred at St. Louis is taken as the standard for that height and the departures from this of the temperatures at the same heights for the day preceding and the day following are given in so far as the observations permit. In each case the observations were obtained in the evening within an hour or two of 7 p. m. The tracks of the centers of maximum pressure are given on an accompanying chart, fig. 1. On this chart a circle of 300 miles radius (about 500 kilometers) is drawn around St. Louis, and it may be seen that all the given dates of maximum pressure at St. Louis are found within this area, while the dates of the preceding and following days are found outside the circle. In every case, except that of July 24 and 25, 1905, the general direction of motion was from northwest to southeast, so that observations on the day preceding were in the southeastern half of the anticyclone and on the day following in the northwestern half. The amounts in the table showing how much the temperatures in the front and in the rear of the anticyclone differed from those in the central area are plotted graphically in the accompanying diagram, fig. 2, which shows that in general it is colder in front of the anticyclone than in the central area, up to about 8 kilometers, above which altitude it becomes warmer. Of the two cases where the temperature in the rear was compared with that in the central area, in one case, January 26, 1905, it was warmer in the rear up to about 6 kilometers, and in the other case, May 10, 1906, it was warmer in the rear up to about 10 kilometers. Above these heights the rear was colder than the central area. The most instructive case is that of May 8 to